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ABSTRACT

In the comparative hearing, the mechanism traditionally used by the Federal Communications Commission (FCC) to choose the best applicant for a broadcast license or frequency allocation, the virtues of each candidate are compared using several criteria, such as integration of ownership and management, but weight has never been fixed to the different criteria. Consequently the comparative hearing process has produced uneven and unpredictable results, and has been subject to much criticism. The comparative hearing process appears to be a good candidate for use of a computer-based decision support system (DSS) using the PrefCalc application program. PrefCalc can have a valid function in discriminating competing applications for a broadcast license. A major caveat is that it relies on qualitative data, and another potential problem is one of comparability. One approach that may be valid would be to have individual decision makers rank each alternative on each criterion. The mean score on each criterion could be used in subsequent analyses. With the constraint of having to process thousands of applications in a short period of time, the FCC could use quantitative criteria and the modeling tool of additive utility theory to allocate licenses quickly, efficiently, and fairly. (Three figures are attached.) (RAE)

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A Quantitative Approach to Resolving Comparative Hearings

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Introduction

Frequently the Federal Communications Commission (FCC) is faced with the task of choosing the "best" applicant for a broadcast license or frequency allocation. The mechanism traditionally used to determine the best applicant is the comparative hearing. In this hearing, the virtues of each candidate are compared across several criteria, such as integration of ownership and management and ownership of other media. But while the FCC has published policy statements on the importance of the criteria, it has never given fixed weights to them. Consequently, the comparative hearing process has produced uneven and unpredictable results, and has been subject to much criticism.

The comparative hearing process appears to be a good candidate for use of a computer-based decision support system (DSS). The DSS would allow the FCC to consider the attributes of all candidates in an objective, systematic manner. Use of such a system could result in better decisionmaking and increased satisfaction in the comparative hearing process for all the parties involved.

The decision support system advocated here uses additive utility theory to pick the best choice from a series of alternatives. Choosing the best student out of a class, the best automobile to buy, or the best corporation to raid are all uses of such a system. It has both practical and social-scientific

applications.

This paper will describe the comparative hearing process in some detail, consider criticisms of the system and alternate approaches to license allocation, and then will examine the merits of using a computer-based DSS as a solution to the problem. It will then offer a detailed look at how one particular application program, PrefCalc, can be set up to deal with the comparative hearing process.

The FCC's Role in Broadcast Licensing

The FCC is mandated by Congress to ensure that American broadcasters serve "the public interest, convenience, and necessity." Behind this broad delegation of authority are some specific rules which are contained in the Communications Act of 1934. Also contained in the Communications Act is the responsibility for the FCC to oversee licensing functions to promote an efficient, nationwide system of broadcasting.

Initially, licensing arose as a solution to the chaos that accompanied the first major growth period of radio in the 1920s. When two competing stations use the same frequency, the result is interference, which reduces service to the public. The FCC took on a "traffic cop" role to minimize interference and maximize service.

Since the number of allocations is fixed (by policy more than by technolcgical capability) and because broadcasting can be an extremely profitable business, there are often multiple applicants for a given frequency. In this setting, the FCC is

charged with choosing the "best" applicant.

The Comparative Hearing Process

The FCC's solution to allocating licenses is to hold a hearing, determine the relative merits of each applicant, and then award the license to the "best" applicant. Comparative hearings arise under many different circumstances. For example, if an incumbent broadcaster is involved, he almost always wins a comparative hearing. The following discussion is concerned with the type of comparative hearing that arises when parties enter the hearing process more or less as equals. This situation may occur when two or more applicants vie for a previously unused license, when a new range of broadcast services is created (such as Docket 80-90, which will create hundreds of new FM radio spots by squeezing the new ones in between established stations); or when an entirely new service is authorized (such as the case of Low Power Television or Cellular Radio).

The 1965 Policy Statement

For broadcast licenses, the Commission's definitive statement on the criteria considered in awarding licenses is the 1965 Policy Statement on Comparative Broadcast Hearings. In it, the Commission states that its two primary objectives are, "...first, the best practicable service to the public, and, second, a maximum diffusion of control of the media of mass communications." [Policy Statement, 1 Federal Communications Reports, 2d Series, p. 394.] Following is a description of the six criteria the FCC considered that best

indicate success in comparative hearings:

Diversification of Control

On the premise that more broadcast voices is better than a few in a given broadcast market, complete and partial control of other media properties is a factor in the Policy Statement. Part-ownership in a property is weighted less than is full ownership.

Location of other media properties is important, too:

> Other interests in the principal community proposed to be served will normally be of most significance, followed by other interests in the remainder of the proposed service area and, finally, generally in the United States. [Ibid., p. 394.]

The number of other media in the community of interest is also to be considered. For example, ownership of another media property in Chicago would not be very important in granting a Chicago license for another property, but ownership of another property in a small town when applying for a license in that small town would be.

Other conditions in which ownership of other media would be considered more important include size of other properties, proximity to the town of license, and regional or national significance of other properties.

Owner Participation

Full-time participation in station operation by owners is the other significant factor, and is related to the goal of providing the best practicable service. Full-time participation

is weighted heavily, and as time spent at the station decreases, the credit given declines sharply. Other factors considered here include level of position (executive positions weighted more heavily); experience; local residence; and past participation in civic affairs.

Proposed Program Service

The actual programming of a broadcast station is a very important attribute of its ability to serve the public interest. But in the Policy Statement the FCC recognizes that it is very difficult to evaluate content. Consequently, "decisional significance will be accorded only to material and substantial differences between applicants' proposed program plans...Substantial differences will be considered to the extent that they go beyond ordinary differences in judgment and show a superior devotion to public service." [Ibid., p. 397.]

While the FCC has recently become involved in program content that is indecent, it generally is very reluctant to regulate on the basis of program content.

Past Broadcast Record

Previous broadcasting experience can be a good indicator of future success, so it is a valid factor here. However, not every applicant will have some experience. The FCC thus decided that

"a past record within the bounds of average performance will be disregarded, since average future performance is expected...We are interested in records which, because either unusually good or unusually poor, give some indication of unusual performance in the future." [Ibid., p. 398.]

Efficient Use of Frequency

"Efficient" in this case is an engineering issue. For example, if a broadcaster can find a better antenna site that will improve his coverage with a given signal, then his station is given some credit. In general, though, efficiency is only considered when there is a differential between competing applications.

Character

Character is a consideration for licensees under the Communications Act of 1934. In comparative hearings, "significant character deficiencies may warrant disqualification, and an issue will be designated where appropriate." [Ibid., p. 399.]

Other Factors

Recognizing that policy making is an ongoing and elastic process, the FCC gives itself some breathing room by allowing petitions to add issues when they present the possibility of introducing significant evidence.

Criticism and Proposals

The Comparative hearing process has received its share of criticism from all sides. In the introduction to the 1965 Policy Statement, for example, the Commission states:

> The hearing process is inherently complex, and the subject does not lend itself to precise categorization or to the clear making of precedent. The various factors cannot be assigned absolute values, some

> factors may be present in some cases and not in others, and the differences between applicants with respect to each factor are almost infinitely variable.
>
> Furthermore, membership on the Commission is not static and the views of individual Commissioners on the importance of particular factors may change. [Ibid., p. 393.]

Two extremes could emerge concerning comparative hearings. At one end, the "wise man" approach, Commissioners can respond to the individual circumstances presented by each case. Their decisions are guided by the terms of the Communications Act, precedent, and their ability to synthesize information to arrive at a good decision. At the other extreme, the "quantitative" approach, criteria are announced in advance and are compared on an objective scale. In each case, the "best" qualified applicant wins.

Both extremes offer problems and promise. For example, the quantitative approach lets applicants know in advance what criteria are important. It lends itself to coherent decisions and precedents. But it also offers a disadvantage, as articulated by FCC Commissioner Rosel Hyde in his dissent to the 1965 Policy Statement:

> It would press applicants into a mold in order to meet the Commission's preconceived standards, thus deterring perhaps better qualified applicants from applying; it would preclude significant consideration of material differences among applicants and result in automatic preference of applicants slavishly conforming to the mold, and eventually force the Commission to decide cases on trivial differences among applicants since basically they would all have come out of the same press. [Ibid., p. 400.]

The wise man approach, however, depends on the wisdom and experience of the Commissioners--both of which vary greatly. Also, the Commissioners are forced to solve essentially local

problems from the isolation of Washington D.C. On the positive side, a flexible approach allows Commissioners to decide renewals on the basis of a current agenda. For example, the current FCC is more interested in structural (i.e. ownership) issues and is relatively uninterested in content (i.e. programming) issues. It may feel constrained if forced to decide comparative hearings on the basis of a rigid, quantitative formula.

Lotteries

One possible solution to the comparative hearing process is to grant licenses by lottery. This approach was recently tried in the authorization of Low Power Television (LPTV) and Multichannel Multipoint Distribution Service (MMDS). In both cases, the Commission used the lottery approach because it was inundated with applications--over 10,000 in each instance. (For comparison, there are currently about 10,000 full-power television and AM and FM radio licenses in the country). Faced with a huge backlog of applications that would take years to process, the FCC used lotteries with some success. Of course, there are disadvantages to lotteries as well. The FCC gives up a large measure of control over who gets the licenses. Also, lotteries are vulnerable to the same kind of "profiling" that candidates in comparative hearings use. For example, in the LPTV lottery, applicants with minority owners received a statistical advantage. In some cases, applicants may add minority members to their applications simply in order to enhance their chances of winning. A DSS might allow the FCC to retain the standards of the 1965 Policy Statement while allowing it to process a large

number of applications in a short period of time.

Auctions

Former FCC Commissioner Glen O. Robinson proposes yet another solution to the comparative hearing problem: auctions. He proposes that applicants first meet threshold requirements according to criteria similar to those currently in place. According to Robinson:

> An auction combines the simplicity of a lottery with two additional virtues: first, it would allow the public to recoup the economic value of the benefits conferred upon private licensees; second, an auction, unlike a lottery, would measure the intensity of the applicants' preferences in accordance with the prevalent standard for allocating resources in our economic system. ["An Essay on the Regulatory Watchdogs," Virginia Law Review, March, 1978, p. 240.]

Comparative hearings, lotteries, and auctions, for all their benefits and problems, have a common goal: to choose a qualified applicant for a broadcast license. Ideally, whatever system is ultimately adopted will choose the "best" applicant. Following is a discussion of using the comparative hearing model in conjunction with PrefCalc, a quantitative decision support tool.

A Systematic Approach to Comparative Hearings

PrefCalc is a microcomputer-based program that permits the user to rank alternatives (in this case, competing applicants) on several criteria, and then weight the criteria, either implicitly (by choosing a rank-order preference list) or explicitly (by directly weighing the criteria). PrefCalc chooses the "best" alternative by using a set of additive utility functions:

> The model assessed by UTA (French acronym for Additive Utility [UTilite Additive]) is not a single function, but is a set of utility functions, all of them being models consistent with the decision-maker's a priori preferences. In order to assess such a set of utility functions, we use an ordinal regression method. Using linear programming, it adjusts optimally additive non-linear utility functions so that they fit data which consist of multicriteria evaluations of some alternatives and a subjective ranking of these alternatives given by the decision-maker. [E. Jacquet-Lagreze and J. Siskos, "Assessing a set of additive utility functions for multicriteria decision-making, the UTA method," European Journal of Operational Research 10 (1982) p. 151.]

A PrefCalc Work Session

For simplicity, the following work session uses only five of the variables used by the Commission in deciding comparative hearings. In this scenario, there are five competing applicants for a new UHF television license in a medium-sized market. The data are summarized in database form on the following PrefCalc screen:

Rank	applicants	Value	loca	full	expe	civi	past
1	* IDEAL	1.00	0.1	1.0	1.0	0.8	1.0
2	* long bdcstng	0.89	0.1	1.0	0.6	0.4	0.6
3	* johnson bdcstng	0.67	0.1	1.0	0.0	0.0	0.5
4	* casey bdcstng.	0.66	0.3	0.9	0.6	0.5	0.3
5	* adams bdcstng.	0.59	0.1	0.9	0.1	0.8	0.0
6	* smith bdcstng.	0.44	0.4	0.8	1.0	0.5	1.0
7	* ANTI-IDEAL	0.00	0.4	0.8	0.0	0.0	0.0

All of the criteria are scaled qualitatively on a zero to one scale. At the FCC, administrative law judges would assign

these weights based upon evidence provided with the application.

The first variable is ownership of other media properties in the city of license, (0 meaning no ownership, 1 meaning substantial ownership). The second variable, full-time participation, refers to full-time owner management (0 meaning absentee ownership, 1 meaning full-time participation). The remaining fields represent broadcast experience, civic involvement, and past broadcast record. With PrefCalc, it is possible to scale variables so the highest value can be either the best or worst score on that variable. Missing values are entered as 0.01; PrefCalc excludes these values from the analysis.

After the data are entered, PrefCalc then presents the following table, which summarizes the selected criteria and the extreme scores on each. This presents an opportunity to restrict the analysis according to some threshold limit (much like the SELECT IF statement in the computer package SPSSX). For example, if you only wanted to consider applicants with average program service or better, you could restrict that variable with a least preferred value of .5 instead of 0. PrefCalc would then throw out all cases with a value of less than .5 on the variable program service. After this screen, PrefCalc goes to the database and extracts the remaining cases that meet the criteria specified. In addition to those cases, PrefCalc presents two extreme cases, an IDEAL case and an ANTI-IDEAL case. The IDEAL represents a hypothetical case that has the most preferred values on every variable; it gets a utility score of 1. Conversely, the

ANTI-IDEAL has the least preferred value on every variable and is graded 0. All of cases in the data file fit somewhere between these two extremes, and are graded between 0 and 1.0 by PrefCalc. The best solution, or the applicant that should win the license, has the highest score.

Once the data are entered, the next step is to weight the criteria. The 1965 Policy Statement makes the relevant criteria for the comparative hearing clear but only discusses the relative value of the criteria in a general way.

In a real-world situation, the weights could be assigned in one of two ways. The simplest solution would have the Commission amend the 1965 Policy Statement and announce the weights. Alternatively, they could be assigned by sampling data from recent comparative hearings, and modeling, with PrefCalc, in a post hoc manner.

Since these data are unavailable, for the purpose of this exercise, I have assigned the weights, as best as possible, according to the Commission's intent in the 1965 Policy Statement.

PrefCalc has two methods of assigning the relative importance of each variable. You can either rank-order the alternatives based upon your intuition or "best guess," or or you can weigh the criteria directly. If you select the intuition option, PrefCalc iterates to "solve" the problem of how to weight each criterion based upon the characteristics of the applicants you selected as likely winners of the hearing. In this analysis, the intuition method was rejected because it is less objective than weighting the criteria directly.

The second option allows you to directly weight each variable. Initially, you are limited to three weights: a very important criterion is given a 3, an important one is given a 2, and an unimportant one is given a 1. PrefCalc then creates graphs based upon the data and the preferences stated at this step.

These graphs, seen in Figure 1, are the heart of PrefCalc's special abilities. Each variable is presented in its own graph. In the upper right corner of each graph is the proportion of weight that variable received; this sums to one. Across the X axis of each graph is the range of scores available on each variable. The utility curve represents the additive utility of different values on a variable. For example, on the graph for ownership of other local stations (upper left on figure 1), the best score by any applicant is .1 while the worst score is .4. But according to the graph, owning other local properties is not that costly until the score reaches .34, where the additive utility rapidly declines. Note that the Y values on the graph are not displayed due to resolution limitations of the computer, but are available, via a command, in the box in the lower right of the screen.

The IDEAL has a utility value of 1, while the ANTI-IDEAL has a utility value of 0. A good way to conceptualize the score for the IDEAL is to measure the vertical distance between the baseline and the highest point of the utility curve for each variable. The sum of all those vertical lines would equal one. To compare another case, measure the vertical distance on the

utility curve for each variable at the point on the curve where that case lies, and sum those vertical lines. That distance would form a proportion relative to the IDEAL. The numerical value of that proportion is that case's utility score.

One option in PrefCalc is to specify the number of linear pieces on a utility curve. If one piece is specified, the resulting line is analogous to a regression line. The example represented in Figure 1 is calculated with five linear pieces. This permits the utility curve to best follow the data. Figure 2 shows the same data, with the utility curves recalculated with one linear piece. Notice on Figure 2 that, with nonlinearities removed, that the resulting utility scores are slightly different. The decision maker may wish to treat scores on a variable in a linear way; if so, the option is available. If threshold or ceiling values are anticipated, more linear pieces can be added.

In Figure 1, the relative weights of each variable were assigned in a fairly crude way, with the only choices being very important (3), somewhat important (2) and not important (1). What if more precise weights are desired?

Figure 3 shows an iteration in which ownership of other local stations is the most important variable, weighted to account for 58 percent of the outcome. This was done by redrawing the utility curve for that variable. PrefCalc prompts the user to enter new values, and then recalculates the outcome based upon them. In this way, the decision maker can graphically "paint" the utility curves that make the most sense. In Figure 3, because ownership of other local stations is so important, the

relative influence of the other variables is greatly reduced. Notice that the resulting utility scores are recalculated to reflect the different curves and weights.

PrefCalc offers many options for playing "what if" and manipulating the utility curves calculated in a decision making work session. These options are important because the decision-maker can never begin a work session with full information. As the user works his way through PrefCalc new relationships and insights emerge. The only way to account for this new information is to model again with the new information added. Eventually the model will reflect theory and preferences closely. At that point, PrefCalc's "best" selection should mirror the decision-maker's "best" selection.

Summary

PrefCalc can have a valid function in discriminating competing applications for a broadcast license. A major caveat is that it relies on qualitative data. One approach that may be valid would be to have individual decision makers rank each alternative on each criterion. The mean score on each criterion could be used in subsequent analyses.

Another potential problem is one of comparability. If the standardized scores for each applicant are reported, a situation may arise when an applicant with a utility score of .79 is denied a license in one market while another applicant with a utility score of .34 is awarded one in another market. Further, if the FCC decides to award a license to the second-best applicant on

the basis of some external factor, it is inviting a lawsuit from the losing party.

Is this kind of modeling useful for resolving comparative hearings? In most cases, probably not. The FCC would probably prefer to retain control and flexibility over the comparative hearing process by retaining its seat-of-the-pants approach. But under the constraint of having to process thousands of applications in a short period of time (such as the cases of low power TV, MMDS, and Docket 80-90) the FCC could use quantitative criteria and the modeling tool of additive utility theory to allocate licenses quickly, efficiently, and fairly.

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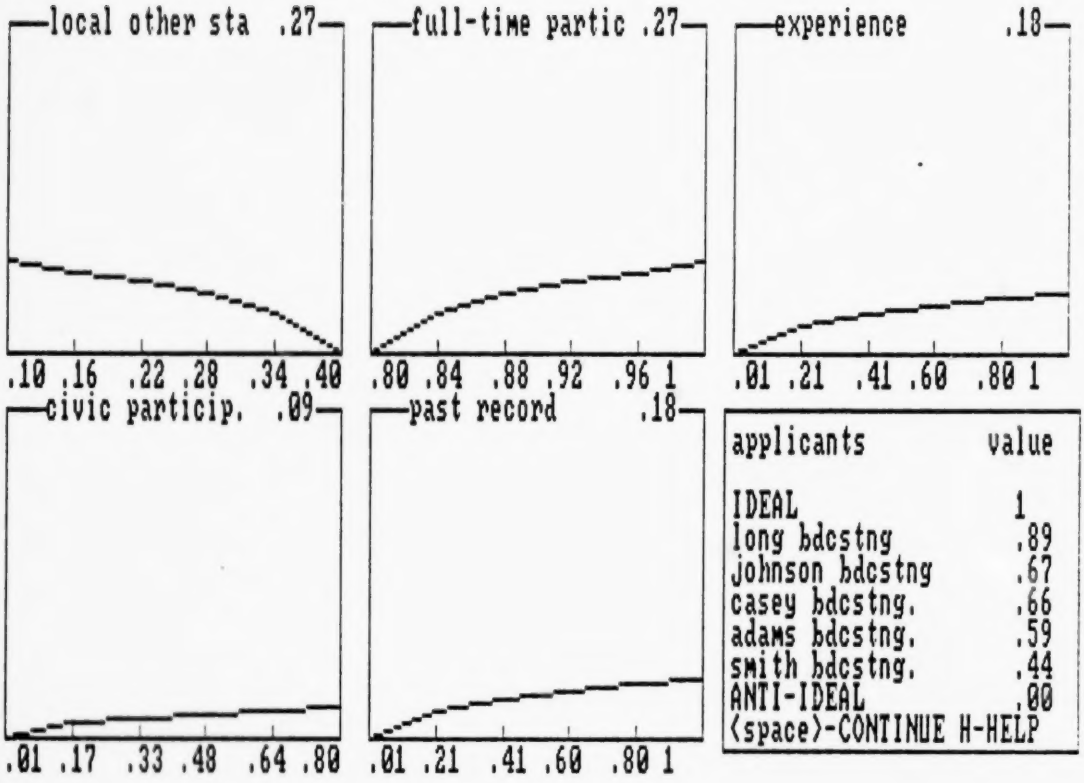
Figure 1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applicants value
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casey bdcstng. .66
adams bdcstng. .59
smith bdcstng. .44
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Figure 2

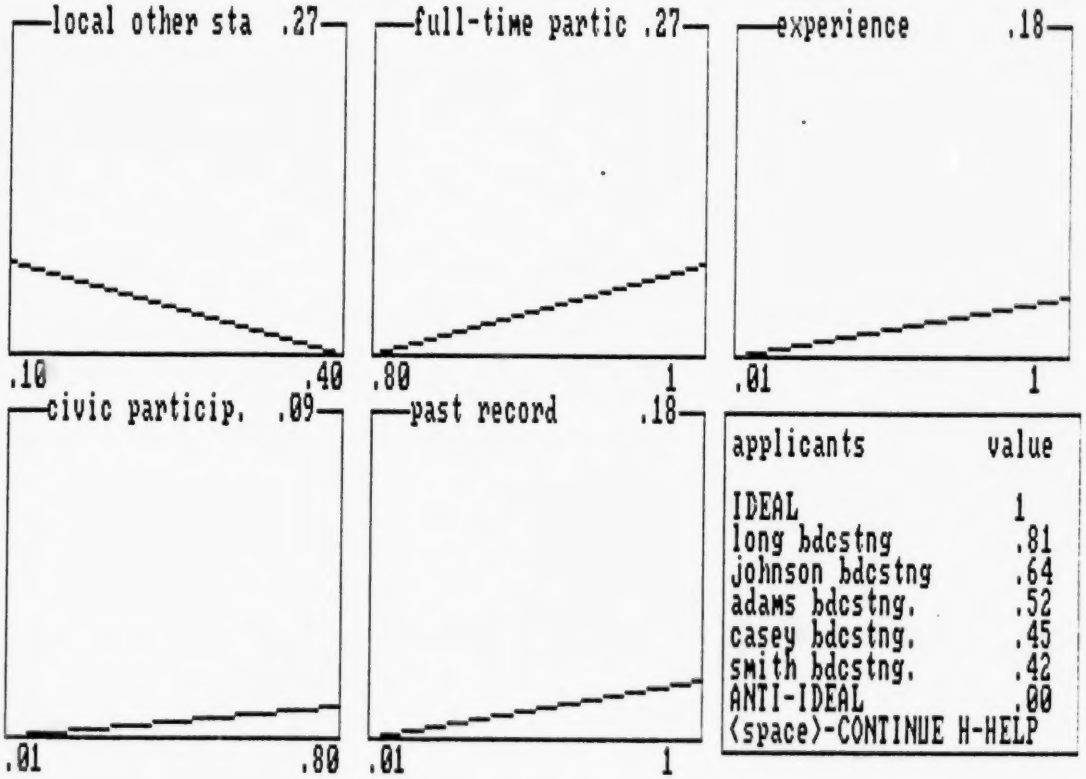
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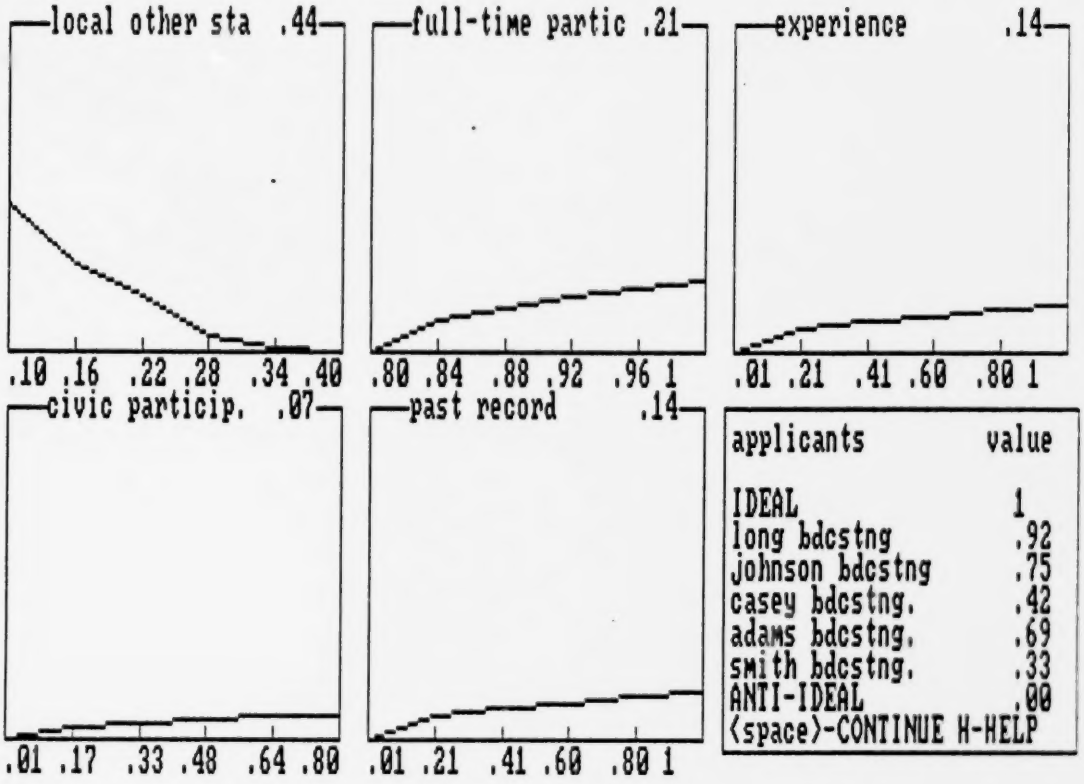
Figure 3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